Feature map size selection for fMRI classification on end-to-end deep convolutional neural networks

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Abstract

The emergence of convolutional neural networks (CNN) in various fields has also paved numerous ways for advancement in the field of medical imaging. This paper focuses on functional magnetic resonance imaging (fMRI) in the field of neuroimaging. It has high temporal resolution and robust to control or non-control subjects. CNN analysis on structural magnetic resonance imaging (MRI) and fMRI datasets is compared to rule out one of the grey areas in building CNNs for medical imaging analysis. This study focuses on the feature map size selection on fMRI datasets with CNNs where the selected sizes are evaluated for their performances. Although few outstanding studies on fMRI have been published, the availability of diverse previous studies on MRI previous works impulses us to study to learn the pattern of feature map sizes for CNN configuration. Six configurations are analyzed with prominent public fMRI dataset, names as Human Connectome Project (HCP). This dataset is widely used for any type of fMRI classification. With three set of data divisions, the accuracy values for validation set of fMRI classification are assessed and discussed. Despite the fact that only one slice of every 118 subjects' temporal brain images is used in the study, the validation of classification for three training-excluded subjects known as validation set, has proven the need for feature map size selection. This paper emphasizes the indispensable step of selecting the feature map sizes when designing CNN for fMRI classification. In addition, we provide proofs that validation set should consist of distinct subjects for definite evaluation of any model performance. (C) 2018 The Authors. Published by IASE.

Keywords

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